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(54) Syringes

(57) Disclosed are syringes characterised by:-

1) An axially slidable sleeve attached to the barrel which can be positioned to shield the needle. The shroud may be spring biassed and lockable in position and may be rotatable to accomodate an off-centre needle.

2) The push-rod being detachable from the piston by means of a rotary break-away mechanism.

3) Prevention of push-rod retraction e.g. by piston retaining means in the barrel, an axial pull break-away mechanism (e.g. ball and socket joint) or a rod, which may be telescopic, which disappears within the barrel on use.

4) A needle retaining nozzle having locking retaining means for the needle, the nozzle optionally being weakened so as to break off if needle removal is attempted.

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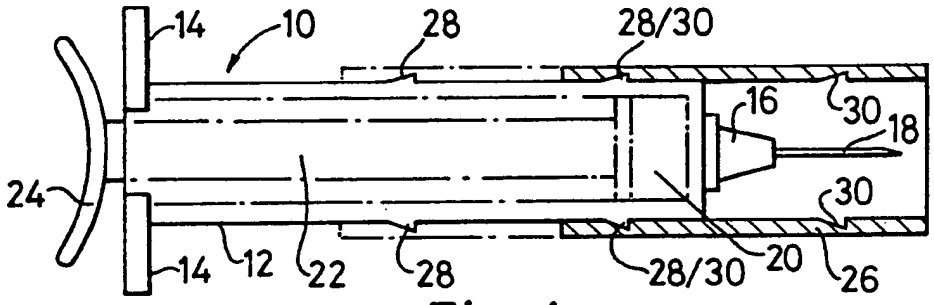

Fig. 1

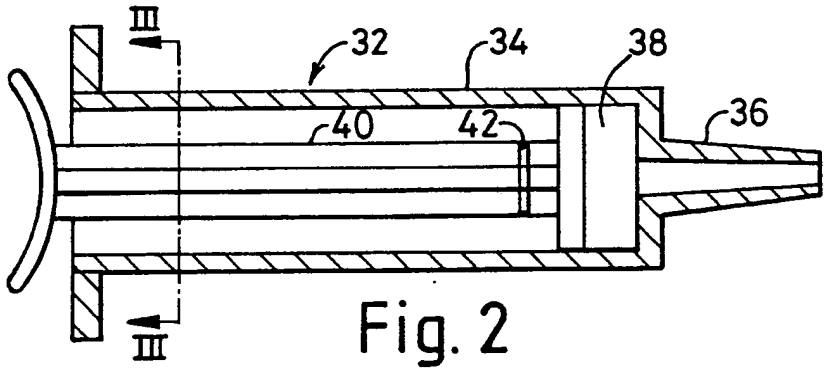

Fig. 2

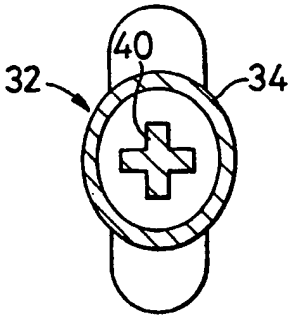

Fig. 3

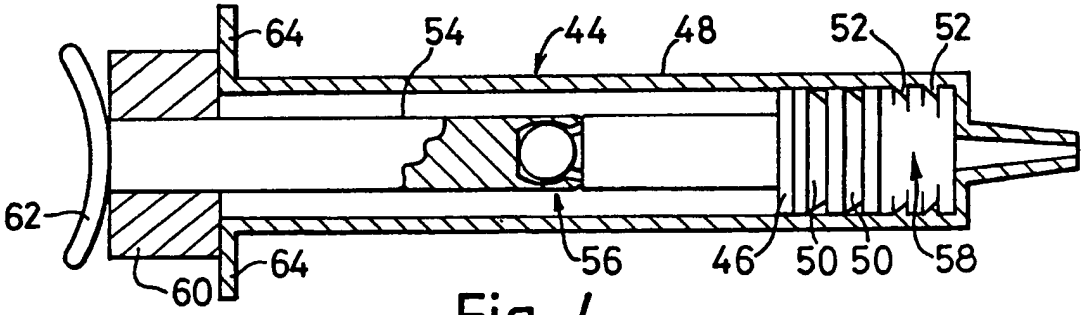

Fig. 4

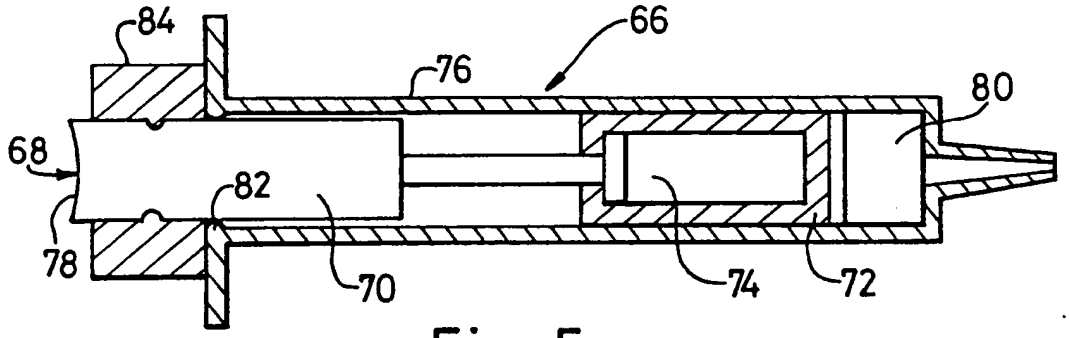

Fig. 5

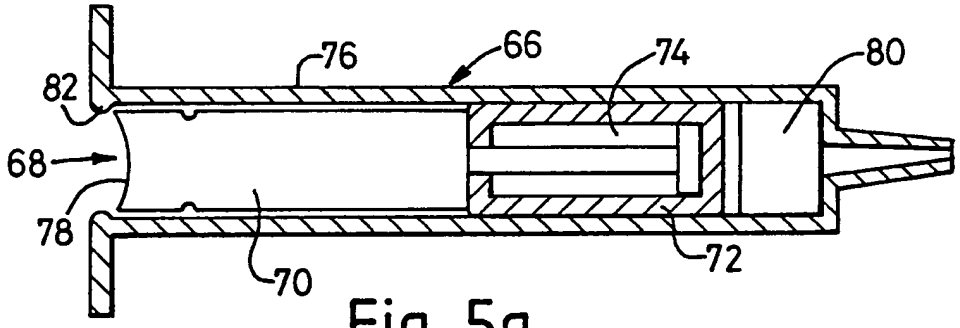

Fig. 5a

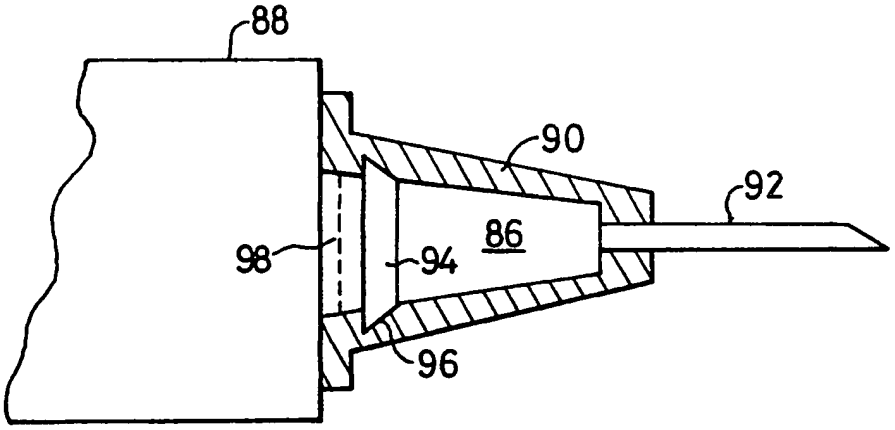

Fig. 6

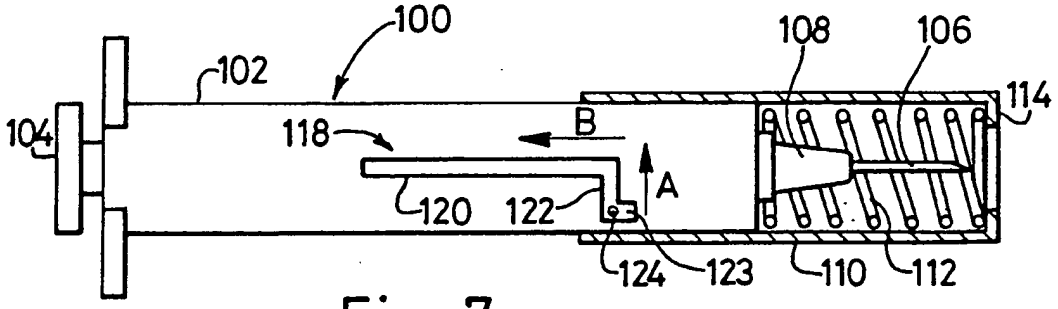

Fig. 7

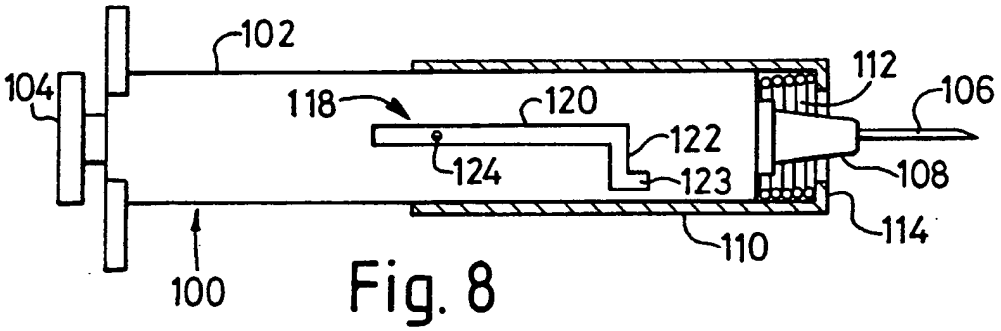

Fig. 8

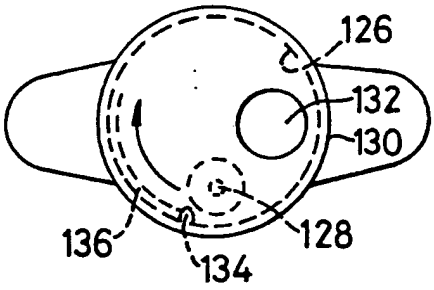

Fig. 9

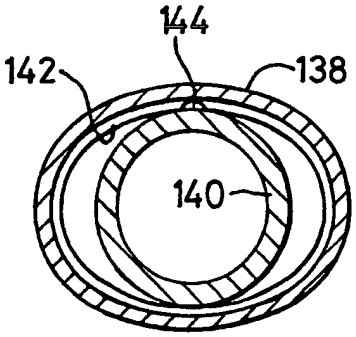

Fig. 10

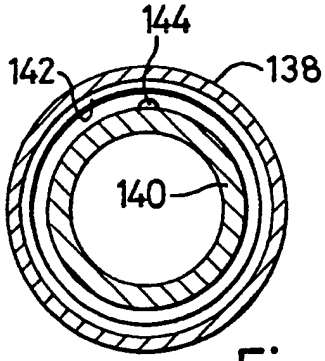

Fig. 10a

"Improvements in or Relating to Syringes"

The present invention relates to medical syringes and is particularly concerned with eliminating or reducing the risk of infection by contact with or re-use of hypodermic syringes.

Disposable syringes are in widespread use throughout the medical profession and once used are regarded as being infected and are discarded. There remains the risk, however, that persons may be infected by used syringes, such as by accidentally stabbing themselves with a used needle, or that used syringes may be stolen prior to incineration and re-used by drug addicts.

Thus, it is an object of the present invention to obviate or mitigate the aforesaid risks.

Even when drug addicts obtain or are supplied with sterile, un-used syringes and needles, the problem of re-use among addicts still remains. Accordingly, it is a further object of the present invention to obviate or mitigate this problem.

In accordance with a first aspect of the invention, a syringe comprising a barrel, plunger means slidable within said barrel and a hypodermic needle extending from one end of said barrel is provided with a generally tubular shroud slidable along the long axis of said barrel between a first position wherein said shroud surrounds said barrel and a second position wherein said shroud projects beyond said one end of said barrel to shield said needle.

The shroud and barrel are preferably provided with co-operating projections and indentations whereby said shroud may be releasably retained in either of said first and second positions.

Alternatively, the shroud may be biased towards the second position by bias means.

Preferably, the shroud is lockable in said second

position.

Preferably also the bias means comprises a coil spring located inside the shroud between the front end thereof and the front end of the barrel of the syringe.

According to a second aspect of the invention, a syringe includes a barrel, plunger means slidable within said barrel and an actuating member extending rearwardly from said plunger means, wherein said barrel and said plunger means are adapted to be non-rotatable with respect to one another so that the actuating member may be broken after use by twisting.

Preferably, said barrel and said plunger means are of complementary, non-circular section and said actuating member is weakened at a point adjacent said plunger means so as to be relatively weak in torsion.

It is particularly preferred that the barrel and plunger means are oval in section.

According to a third aspect of the invention, a syringe comprising a barrel, plunger means slidable within said barrel and an actuating member extending rearwardly from said plunger means is adapted to prevent withdrawl of said plunger means once it has been pushed home.

Preferably, means are provided to retain said plunger means within said barrel once it has been pushed home.

Preferably also, said actuating member is adapted to be relatively strong in compression and relatively weak in tension such that it breaks or comes apart if an attempt is made to withdraw it after use.

Alternatively, said actuating member is of variable length such that the rearward end thereof is lost within said barrel once the plunger means is pushed home.

According to a fourth aspect of the invention, a syringe includes a barrel having a nozzle extending from the end thereof to receive a hypodermic needle located in

a collar, said collar being adapted to fit over said nozzle, and said nozzle and said collar are provided with co-operating retaining means for preventing subsequent removal of said needle once it has been fitted onto the syringe.

Preferably said retaining means comprises co-operating projections and indentions formed on the exterior of said nozzle and the interior of said collar.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 is a side view, partly in section, of a syringe embodying a first aspect of the invention;

Fig. 2 is a sectional side view of a syringe embodying a second aspect of the invention;

Fig. 3 is a section on line III-III of Fig. 2;

Figs. 4, 5 and 5a are sectional side views of syringes embodying a fourth aspect of the invention; and

Fig. 6 is an enlarged fragmentary view of the nozzle of a syringe.

Fig. 7 is a side view, partly in section, of a syringe fitted with a needle guard which is a modification of the embodiment of Fig. 1;

Fig. 8 shows the syringe and guard of Fig. 7 with the guard retracted to expose the needle;

Fig. 9 is an end view of a guard adapted for use with a syringe having an off-centre needle; and

Figs. 10 and 10a are sectional end views of a syringe and an alternative embodiment of the needle guard.

Referring now to the drawings, Fig. 1 shows a syringe 10 comprising a barrel 12 having laterally extending finger portions 14 at the rearward, open end thereof and an outlet nozzle (not shown) at its forward, closed end, over which is mounted a collar 16 with a hypodermic needle 18 located therein. A plunger 20 is slidable within the barrel 12 and sealingly engages the interior side

walls 22 thereof. The plunger 20 is operated by an actuating member 22 which extends rearwardly therefrom and is provided with a thumb piece 24.

In accordance with a first aspect of the present invention the syringe 10 is provided with a shroud in the form of a generally tubular sleeve 26 which surrounds the barrel 12 and is slidable along the exterior thereof between a first postion (shown in broken lines) and a second, extended position wherein the sleeve 26 extends beyond the forward end of the barrel 12 to shield the needle 18. The syringe may be used normally with the sleeve 26 in its first position. After use, the sleeve 26 may be moved forward into its second position to protect the needle until the syringe 10 may be disposed of safely. Co-operating projections 28 and indentations 30 may be provided on the exterior of the barrel 12 and the interior of the sleeve 26 to releasably retain the sleeve 26 in either its first or second postion.

Figs. 2 and 3 illustrate a second aspect of the invention. A syringe 32 again comprises a barrel 34, with a nozzle 36 at its forward end adapted to receive a hypodermic needle (not shown) as before, a plunger 38 and actuating member 40. As is best seen in Fig. 3, the barrel 34 and plunger 38 are oval in section and are therefore non-rotatable with respect to one another, unlike conventional syringes of circular cross-section. After the syringe 32 has been used the actuating member 40 may be broken off simply by twisting it, thereby rendering the syringe 32 unusable. The actuating member 40 is preferably weakened at a point 42 adjacent the plunger 38 so as to be relatively weak in torsion at that point.

Obviously, the barrel 34 and the plunger 38 need not be oval. Any non-circular section will prevent relative rotation of the plunger 38 and barrel 34, as would the provision of co-operating projections and grooves on the plunger and barrel of a circular section syringe.

The syringe 32 of Figs. 2 and 3 is thus easily broken after use and prior to incineration, eliminating the risk of used syringes being stolen and re-used.

Figs. 4, 5 and 5a show further syringes intended to be usable once only and suitable for issue to drug users to reduce the risk of spreading infection by sharing syringes.

The syringes 44 shown in Fig. 4 is adapted to prevent withdrawal of the plunger 46 from the barrel 48 once it has been pushed fully home. For this purpose annular grooves 50 are provided around the circumference of the plunger 46 and corresponding annular projections 52 are provided around the interior of the barrel 48 at the inner end thereof. When the plunger 46 is pushed home the grooves 50 engage the projections 52 and prevent it from being withdrawn again. The actuating member 54 may also be made to be relatively strong in compression and relatively weak in tension (such as by provision of a ball and socket connection 56) so that it will break or come apart if an attempt is made to withdraw the plunger after use.

Since the plunger 46 cannot be pushed fully home prior to use, a space 58 must be left at the inner end of the barrel 48 before use. A removable cuff 60 may be provided between the thumb piece 62 and finger projections 64 to prevent the plunger being accidentally pushed home before the syringe 44 is used.

In the syringe 66 of Figs. 5 and 5a, the actuating member 68 is made in two parts 70, 72, so as to be of variable length such as by means of a piston and cylinder arrangement 74.

The parts 70, 72 of the actuating member 68 are preferably generally cylindrical and a relatively close fit inside the barrel 76, the outer end of the rearward part 70 forming a thumb piece 78. Thus, as is shown in Fig. 5a, when the plunger 80 is pushed fully home the thumb

piece 78 is lost inside the barrel 76 and cannot be subsequently withdrawn.

Suitable retaining means, such as an annular projection 82 on the inside surface of the barrel 78 adjacent the open end thereof, may be provided to further ensure that the plunger 80 cannot be withdrawn again after use. A removable cuff 84 is again provided to prevent accidental loss of the actuating member 68 within the barrel 76 prior to use.

The cuff 84 is preferably lockable (such as by means of a bayonet fitting or the like) to prevent accidental removal.

The syringes 32, 44 and 66 of Figs. 2, 4, 5 and 5a are all adapted to prevent re-use of the syringes themselves. They do not, however, prevent the risk of hypodermic needles being re-used, which are normally mounted in collars (as in Fig. 1) which are a simple pushfit over the nozzle of the syringe. Fig. 6 shows a nozzle 86 of a syringe barrel 88 and a collar 90 having a hypodermic needle 92 located therein adapted to prevent removal and re-use of the needle 92. For this purpose, an annular projection 94 is formed on the surface of the nozzle 86 and a corresponding annular groove 96 is formed on the interior surface of the collar 90 so that the collar 90 may simply be pushed onto the nozzle 86 but may not be removed thereafter.

In addition, the nozzle 86 may be weakened at a point 98 behind the projection 94 so that it will break if an attempt is made to remove the collar 90.

The invention thus provides a number of simple modifications to conventional syringes which serve to eliminate or substantially reduce the risk of infection from used syringes.

A number of obvious variations of the illustrated embodiments will be apparent to those skilled in the art. In particular, the various retaining means for the shroud of Fig. 1, the plungers and actuating member of Figs. 4,

5 and 5a and the collar nozzle of Fig. 6 may be widely varied both in type and location.

Figs. 7 to 10(b) illustrate modifications of the embodiment of Fig. 1. Figs. 7 and 8 show a syringe 100 comprising a barrel 102 and plunger 104 and having a hypodermic needle 106 mounted in a collar 108 fitted to the forward end thereof. The syringe 100 is provided with a needle guard comprising a generally tubular shroud 110, slidable along the barrel 102 between a first position (Fig. 8) wherein the needle 106 is exposed and a second position (Fig. 7) wherein the shroud 110 shields the needle 106. The shroud 110 is biased towards its second position by bias means such as a coil spring 112 located between an inwardly extending annular flange 114, formed at the forward end of the shroud 110, and the forward end of the syringe barrel 100.

The shroud 110 is preferably lockable in its second position before and after use, requiring positive action by the user to unlock it. In the example illustrated, locking means for this purpose comprises a generally L-shaped groove 118 formed in the side of the barrel 100, having a first axially extending limb 120, a circumferentially extending limb 122 at the forward end thereof and a short second axially extending portion 123 extending forwardly from the end of limb 122 remote from the limb 120, and a cooperating projection 124 formed on the interior surface of the shroud 110. In Fig. 7 the shroud 110 is locked in its second position and may be unlocked by pushing it back and rotating it about the barrel 100 in the direction of the arrow A, whereafter it may be slid rearwardly against the force of the spring 112 in the direction of arrow B into the first position of Fig. 8. It can be seen that the locking means also serves to limit the forward movement of the shroud 110. It is desirable that the shroud 110 returns automatically to its locked

condition after use, and this may be achieved by having one end of the spring 112 engaging the shroud 110 and the other end engaging the barrel 100 such that rotation of the shroud in the direction A is against the torsional force of the spring 112. The combined axial and torsional forces of the spring 112 would then automatically return the shroud 110 to its locked position when released from the first position of Fig. 7.

Alternative locking means may be used in place of the illustrated arrangement. for example, the locking means might be adapted to be released automatically in response to pressure applied to the front of the shroud 110 and to re-engage automatically under the return force of the spring 112, however, it is particularly envisaged that the shroud 110 , in use, will be pushed back into its first position automatically when an injection or the like is being administered so that the spring 112 should be relatively weak to minimise any discomfort caused to the patient. It is also preferable that deliberate action is required to unlock the shroud 110.

One arrangement of this type is shown in Figs. 10 and 10(a). The shroud 138 is made from deformable resilient material (such as plastics material) and is slightly oval in section, its smallest internal diameter corresponding to the outer diameter of the syringe barrel 140. The shroud 138 is provided with an internal annular groove 142 which cooperates with a projection 144 on the barrel 140. When relaxed, as shown in Fig. 4 (a), the projection 144 engages the groove 142, locking the shroud 138 in position. The shroud 138 may be released by squeezing it so that it deforms to a substantially circular shape (Fig. 10 (b)), such that the groove 142 is disengaged from the protection 144 allowing the shroud 138 to be slid along the barrel 140. When released, the spring (not shown) will return the shroud 138 to its lock-

ed position.

Fig. 9 shows a modification of the guard of Fig. 7 for use with a syringe 126 (shown in broken lines) having a needle 128 located off-centre on the end thereof. In this case the forward end of the shroud 130 is closed and has an aperture 132 formed adjacent the periphery thereof. Rotation of the shroud 130 in the direction of arrow C unlocks the shroud 130 (locking means again comprising a projection 134 on the interior of the shroud 130, and circumferential (136) and axial (not shown) grooves on the barrel of the syringe 126 and at the same time brings the aperture 132 into alignment with the needle 128.

It may also be preferable for the various types of shrouds herein described to be adapted to be removable to facilitate "loading" of the syringe (the sterile, unused needle not being dangerous), whereafter they may be fitted so as to protect the needle after use.

Claims

1. A syringe comprising a barrel, plunger means slidable within said barrel and a hypodermic needle projecting from one end of said barrel, said syringe being provided with a generally tubular shroud slidable along the long axis of said barrel between a first position wherein said shroud surrounds said barrel and a second position wherein said shroud projects beyond said one end of said barrel to shield said needle.

2. A syringe as claimed in claim 1 wherein said shroud and said barrel are provided with co-operating projections and indentations whereby said shroud may be releasably retained in either of said first and second positions.

3. A syringe as claimed in claim 1 wherein said shroud is biased towards said second position by bias means.

4. A syringe as claimed in claim 3 wherein said bias means comprises a coil spring located inside the shroud between the front end thereof and the front end of the barrel of the syringe.

5. A syringe as claimed in claim 3 or claim 4 wherein locking means are provided for locking said shroud in said second position.

6. A syringe as claimed in claim 5 wherein said locking means comprises a projection and a co-operating, generally L-shaped groove, one of said projection and said groove being formed on the inner surface of said shroud and the other being formed on the outer surface of said barrel.

7. a syringe as claimed in claim 5 wherein said shroud is formed from a deformable resilient material and is oval in section, said barrel being provided with a projection on its outer surface and said shroud being provided with a co-operating annular groove on its inner surface, said projection and said groove being so positioned that they engage one another when said shroud is in its second position so as to prevent said shroud being slid along said

barrel, said shroud being releasable from said second position by deforming said shroud towards a generally circular section.

8. A syringe as claimed in claim 5 or claim 6 wherein said needle is located off-centre on the front end of said barrel wherein said shroud is rotatable about said barrel between a locked and an unlocked position, and wherein the front end of said shroud is closed and is provided with an aperture also located off-centre thereof, the aperture and needle being so disposed that said aperture is aligned with said needle when said shroud is in its unlocked position.

9. A syringe including a barrel, plunger means slidable within said barrel, and an actuating member extending rearwardly from said plunger means, wherein said barrel and said plunger means are adapted to be non-rotatable with respect to one another so that the actuating member may be broken after use by twisting.

10. A syringe as claimed in claim 9 wherein said barrel and said plunger means are of complementary, non-circular section.

11. A syringe as claimed in claim 10 wherein said barrel and said plunger means are oval in section.

12. A syringe as claimed in any of claims 9, 10 or 11 wherein said actuating member is weakened at a point adjacent said plunger means so as to be relatively weak in torsion.

13. A syringe comprising a barrel, plunger means slidable within said barrel and an actuating member extending rearwardly from said plunger means and adapted to prevent withdrawal of said plunger means once it has been pushed home.

14. A syringe as claimed in claim 13 wherein means are provided to retain said plunger means in said barrel once it has been pushed home.

15. A syringe as claimed in claim 14 wherein said plunger means and the innermost end of said barrel are provided

with co-operating annular grooves and projections which engage one another when said plunger means is pushed home so as to prevent its subsequent withdrawal.

16. A syringe as claimed in claim 14 or claim 15 wherein said actuating member is adapted to be relatively strong in compression and relatively weak in tension such that it breaks or comes apart if an attempt is made to withdraw it after the plunger means has been pushed home.

17. A syringe as claimed in claim 16 wherein said actuating member is divided into two pieces attached to one another by means of a ball and socket connection such that the two pieces will separate if an attempt is made to withdraw the actuating member after the plunger means has been pushed home.

18. A syringe as claimed in claim 13 wherein said actuating member is of variable length such that the rearward end thereof is lost within said barrel once the plunger means has been pushed home.

19. A syringe as claimed in claim 18 wherein said actuating member is formed in two parts operably connected together and adapted to be of variable length by means of a piston and cylinder arrangement.

20. A syringe including a barrel having a nozzle extending from the end thereof to receive a hypodermic needle located in a collar, said collar being adapted to fit over said nozzle, and said collar being provided with co-operating retaining means to prevent subsequent removal of said needle once it has been fitted onto said syringe.

21. A syringe as claimed in claim 20 wherein said retaining means comprises co-operating projections and indentations formed on the exterior of said nozzle and the interior of said collar.

22. A syringe as claimed in claim 20 or claim 21 wherein said nozzle is weakened such that it will break, leaving the nozzle retained within the collar, if an attempt is

made to remove the collar therefrom.

23. A syringe substantially as hereinbefore described with reference to Fig. 1 of the drawings.

24. A syringe substantially as hereinbefore described with reference to Figs. 2 and 3 of the drawings.

25. A syringe substantially as hereinbefore described with reference to Fig. 4 of the drawings.

26. A syringe substantially as hereinbefore described with reference to Figs. 5 and 5(a) of the drawings.

27. A syringe substantially as hereinbefore described with reference to Fig. 6 of the drawings.

28. A syringe substantially as hereinbefore described with reference to Figs. 7 and 8 of the drawings.

29. A syringe substantially as hereinbefore described with reference to Fig. 9 of the drawings.

30. A syringe substantially as hereinbefore described with reference to Figs. 10 and 10(a) of the drawings.

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